

Remarks

Further and favorable reconsideration is respectfully requested in view of the foregoing amendments and following remarks.

Initially, referring to item 1 on page 2 of the Office Action, where the Examiner objects to the disclosure, it appears that these errors only occur in the published version of the present application. Copies of the abstract and the page including paragraph [0014] as filed are enclosed, from which it is apparent that the errors referred to by the Examiner were not present in the application as filed. Accordingly, these portions of the application have not been amended.

Claim 1 has been amended to incorporate the subject matter from paragraph [0022] of the specification concerning the manner in which the polyurethane resin is obtained, and also to incorporate subject matter from paragraph [0060] concerning the proportion of the acid group of the polyurethane resin relative the basic nitrogen atom of the polyamine.

Claim 2 has been amended in view of the amendments to claim 1, and also to specify the chain-extension agent based on paragraph [0039] of the specification.

Claim 3 has been amended in view of the amendments to claim 1.

Claim 4 has been amended to depend from claim 1.

Claim 6 has been amended to depend from new claim 15, and Applicants note that new claim 15 corresponds to amended claim 1 except that claim 15 further specifies the acid value of the polyurethane resin and the amine value of the polyamine compound, based on the disclosures in paragraphs [0019] and [0054] of the specification. The acid value and amine value in amended claim 6 are also taken from these same paragraphs of the specification.

New claims 16-21 have been added to the application, and are the same as claims 2-5 and 7-8, respectively, except they are dependent on new claim 15.

The patentability of the presently claimed invention over the disclosures of the reference relied upon by the Examiner in rejecting the claims will be apparent upon consideration of the following remarks.

Thus, the rejection of claims 1-14 under 35 U.S.C. §102(b) as being anticipated by Uchida et al. (US '533/EP '170) is respectfully traversed.

Cited reference:

Uchida et al. disclose an aqueous dispersion comprising a gas barrier polyurethane resin, wherein the polyurethane resin comprises a plurality of urea groups and a plurality of urethane groups; the polyurethane resin has a total concentration of urea groups and urethane groups of 15% by weight or more based upon the total weight, of the polyurethane resin; and the polyurethane resin has both of the following characteristics: (1) the oxygen permeability of the polyurethane resin at a thickness of 25 μm is 50 $\text{ml/m}^2 \cdot \text{atm} \cdot \text{day}$ or less, and (2) the ratio of oxygen permeability of the polyurethane resin at 50%RH to that at 90%RH is 1/1 to 1/2 (claim 1).

Referring to the “Effects of the Invention” at column 11, lines 48-59, Uchida et al. disclose as follows:

“Without using a chlorine-containing compound which contaminates the environment, the present invention can provide a polyurethane resin with far excellent gas barrier properties, particularly a polyurethane resin which shows excellent gas barrier properties even under a condition of high humidity, and a film containing such polyurethane resin. Moreover, since the polyurethane resin of the present invention is excellent in adhesion to a base film as well as in water- and chemical-resistance, the polyurethane resin can be utilized in a variety of fields, such as the field of packaging materials or molding materials.”

Comparison of present invention and reference:

One of the features of the present invention resides in **a combination of a specific polyurethane resin, a swelling inorganic layered compound, and a polyamine compound** in a specific ratio of the acid group of the polyurethane resin relative to the basic nitrogen atom of the polyamine compound. Specifically, in such a combination, it is important that the polyurethane resin is obtained by **reacting** a polyisocyanate compound, a polyhydroxyalkane carboxylic acid and **a chain-extension agent** and **neutralizing** the resultant product.

However, Uchida et al. fail to disclose or suggest such a specific combination of these features.

The Examiner states that Uchida et al. teach a polyurethane resin having a total concentration of the urethane group and the urea group of not less than 15% by weight, a layered inorganic compound and a diamine component.

However, the diamine component disclosed by Uchida et al. is a chain-extension agent or crosslinking agent. That is, the diamine component is reacted with an isocyanate group of a urethane prepolymer and is introduced into the molecular structure of the polyurethane resin disclosed by Uchida et al. Thus, according to Uchida et al., the composition of the polyurethane resin does not substantially contain a free diamine component, and the diamine component disclosed by Uchida et al. does not correspond to the polyamine compound of the present invention, which is present in a free form.

Further, the polyurethane resin of Uchida et al. is neutralized and the neutralized polyurethane resin is combined **not with a diamine component** but an inorganic layered compound only. Thus, the specific ratio of the acid group of the polyurethane resin relative to the basic nitrogen atom of the polyamine compound present in a free form in accordance with the present invention cannot be reached from the teachings of Uchida et al.

Therefore, the present invention is clearly distinct from, and not suggested by, the Uchida et al. reference.

Furthermore, the present invention also shows unexpected results. That is, since Uchida et al. combine a polyurethane resin and a layered inorganic compound, the resultant resin composition corresponds to Comparative Examples 1 and 2 in the present application, and gas barrier properties, in particular, gas barrier properties in a highly humid condition would never be sufficiently improved.

In contrast, according to the present invention, gas barrier properties can be remarkably improved even in a highly humid condition, owing to the above specific combination of features. Such a result is clearly understandable from a comparison of Examples 1-4 and Comparative Examples 1-2 in the present application. According to such a comparison, oxygen permeability which is 6.2 for 50%RH and 24.0 for 80%RH in Comparative Example 1, is improved to 3.6 - 5.8 for 50%RH and 11.6 - 14.5 for 80%RH in Examples 1-3. Moreover, oxygen permeability which is 8.4 for 50%RH and 27.4 for 80%RH in Comparative Example 2, is also improved in Example 4, where oxygen permeability is 4.2 for 50%RH and 13.2 for 80%RH.

Such results would never have been predicted from the Uchida et al. reference.

For these reasons, Applicants take the position that the presently claimed invention is clearly patentable over this reference.

The rejection of claims 1-4 and 7 for obviousness-type double patenting as being unpatentable over claims 1-7 of USP 6,979,493 is respectfully traversed.

The '493 patent claims an aqueous dispersion comprising a gas barrier polyurethane resin, wherein the polyurethane resin comprises a plurality of urea groups and a plurality of urethane groups; the polyurethane resin has a total concentration of urea groups and urethane groups of 30 to 42.9% by weight based upon the total weight of the polyurethane resin; the polyurethane resin comprises a diisocyanate selected from the group consisting of an aromatic diisocyanate, an araliphatic diisocyanate, and an alicyclic diisocyanate, a C₂₋₈ diol and a diamine having 8 or less carbon atoms; and the polyurethane resin has a glass transition temperature of 100 °C or higher (claim 1) .

The '493 patent also claims that the aqueous dispersion further comprises at least one member selected from the group consisting of a silane coupling agent and a layered inorganic compound (claim 6) .

Applicants take the position that the presently claimed invention is patentable over claims 1-7 of the '493 patent for the same reasons as indicated above, concerning the distinctions between the present invention and the Uchida et al. reference (US '533).

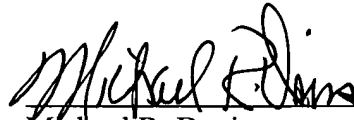
Furthermore, with regard to both the rejection under 35 U.S.C. §102(b) and the obviousness-type double patenting rejection, attention is directed to new claim 15 (and claims 16-21 dependent thereon), which in addition to the features of amended claim 1, further specifies that the acid value of the polyurethane resin is 15 to 60 mgKOH/g, and the amine value of the polyamine compound is 200 to 1700 mgKOH/g. These additional features of the claimed invention further distinguish the invention from both the Uchida et al. reference (US '533) and claims 1-7 of the '493 patent.

Therefore, in view of the foregoing amendments and remarks, it is submitted that each of the grounds of objection and rejection set forth by the Examiner has been overcome, and that the application is in condition for allowance. Such allowance is solicited.

Respectfully submitted,

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By:

A handwritten signature in black ink, appearing to read "Michael R. Davis", is written over a horizontal line.

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and a montmorillonite. Further, the acid value of the polyurethane resin (i) may be about 5 to 100 mgKOH/g. The amine value of the polyamine compound (iii) may be about 100 to 1900 mgKOH/g. Moreover, the proportion of the acid group of the polyurethane resin (i) relative to the basic nitrogen atom of the polyamine compound (iii) [(i)/(iii)] may be about 10/1 to 1/5 as the equivalent ratio.

Furthermore, the ratio of the swelling inorganic compound (ii) relative to the polyurethane resin (i) [(ii)/(i)] may be about 1/100 to 200/100 in terms of solid content. The polyurethane resin (ii) may be a water dispersion in which the resin is dispersed in water, or an aqueous solution in which the resin is dissolved in water.

[0014] The present invention also includes a laminated film (or laminate) comprising a base film, and a layer formed on at least one surface of the base film, wherein the layer comprises the aqueous resin composition.

EFFECTS OF THE INVENTION

[0015] According to the present invention, the combination use of a polyurethane resin having a urethane group and a urea group in a high concentration and having an acid group, a swelling inorganic layered compound, and a polyamine compound realizes excellent gas barrier properties (gas barrier properties against oxygen, water vapor, an aroma (or fragrant) component, and others). Moreover, by the combination mentioned above, excellent